Sampling Design for a Statewide Survey of Contaminants in Sport Fish in California Rivers and Streams

The Bioaccumulation Oversight Group
Products and Timeline

- BOG planning discussions - November-January
- Draft Sampling Plan and QAPP - January
- Peer Review Panel meeting - February
- Finalize Sampling Plan and QAPP - End of February
- Begin sampling - End of February
- Year 1 data available - May 2012
- Draft report on year 1 - January 2013
- Final report on year 1 - May 2013
SWAMP/BOG Monitoring Objectives

1. Status
2. Trends
3. Sources and Pathways
4. Effectiveness of Management Actions

Over the long-term, primary BOG emphasis on 1 and 2; 3 and 4 are secondary

In the near-term, emphasis on 1 (Status)
Beneficial Uses

1. Fishing
2. Aquatic Life

Over the long-term, the Program will evaluate the impacts of bioaccumulation on both, with an emphasis on 1.

In the near-term, emphasis on 1 - Aquatic Life NOT INCLUDED
Toolbox of Bioaccumulation Indicators

- Sport fish
- Prey fish
- Birds
- Mammals
- Bivalves
Benefits of This Survey

• Consistent statewide assessment of all water body types
  • Overall summary report when we’re done
• Rivers and streams part of long-term survey cycle
• Fuller array of analytes
Significant Prior Work

- TSMP
- Fish Mercury Project
- Region 5 Studies
  - Mercury
  - Organics
- Sacramento River Watershed Program
- UC Davis
- USGS - Alpers et al, Valley work
- USEPA National Rivers and Streams Assessment
## Budget

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
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<tbody>
<tr>
<td>SFEI Coordination</td>
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<tr>
<td>MPSL Coordination &amp; QAPP prep</td>
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<td>Data Entry and Validation</td>
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<td>Data Analysis and Reporting</td>
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<td>Freezer Costs</td>
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</table>

**Total** $745,782

Amount available for sampling and analysis:  
~ $426,000

With these assumptions, budget covers 41 sites
Management Questions For This Screening Study

1. Status of the Fishing Beneficial Use
   - For popular fish species, what percentage of popular fishing areas have low enough concentrations of contaminants that fish can be safely consumed?
   - Indicator: lakewide average concentration

2. Regional Distribution
   - What is the regional distribution of contaminant concentrations in fish?

3. Need for Further Sampling
   - Should additional sampling of bioaccumulation in sport fish (e.g., more species or larger sample size) in an area be conducted for the purpose of developing comprehensive consumption guidelines?

LAKES

1. 305(b): What is the condition of California lakes with respect to contamination?
   - Indicator: lakewide average concentration

2. 303(d): Should a given lake be on the 303(d) list?
   - Indicator: Two independent samples above the relevant guideline (different days or different locations)

3. (Consumption Guidelines: Should additional sampling be conducted for the purpose of developing an advisory?)

COAST

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Audience

- Policy makers
- Water quality managers
- The fishing public
Design Basics

- Target species of concern: humans that consume fish
- Population of spatial units: fishing locations
- Species of interest
  - Fish species that are:
    - Popular
    - Widely distributed
    - Good indicators
Coordination

Coordinated Efforts

• Are there any other studies happening that we should coordinate with?
• Check into:
  • Alpers work in the Sierra
  • The Sierra Fund
Strategy for Phasing

- One year
- No phasing needed
Spatial Units: Fishing Locations

• Similar to locations used in lakes
• Up to 1 mile length
• Considerations for selection
  • Coverage of popular locations for sport fish consumption
  • Stakeholder (Regional Board) interest
Locations

- See Gary’s spreadsheet for latest list
Questions

- How far to go with coverage of streams?
  - A: hit popular locations as defined by Stienstra and Regional Boards
Design Within Each Location

- Replication to support 303(d) listing?
  - No

- Sampling design with a follow-up strategy to conserve budget?
  - No
Target Species

- Fish species that are (in order of priority):
  1. Popular for consumption
  2. Sensitive indicators of problems - “bad boys” - for the different pollutants of concern - helps with evaluating safe consumption
  3. Widely distributed - spatial coverage and patterns
  4. Represent different exposure pathways (benthic vs pelagic)
  5. Continuity with past sampling
Target Species

• Primary Targets
  • Where appropriate, two indicator species per location
    ▪ Mercury indicator: e.g., largemouth
    ▪ Organics indicator: high lipid benthic species
    ▪ Most locations will only have trout - sample one species at these locations

• Secondary Targets
  • In case primary targets are not found

• Vary by region

• Bycatch
### Target Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Foraging Type</th>
<th>Trophic Level</th>
<th>Distribution</th>
<th>Good Candidate</th>
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<tbody>
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<td>Low Sierra</td>
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Target Size Ranges and Compositing for Each Species

- Composite to stretch dollars
- Use 75% rule
- Target middle of distribution that is caught and consumed
- Need to determine ranges
- Numbers in composites
  - Generally 5
Questions

• How to handle hatchery vs resident fish?
  • A: try to get residents
Sample Processing and Analysis

- Ancillary data
  - Total length, fork length
  - Location coordinates
  - Field observations: bycatch, others?

- Skin-off fillets
Analytes in Tissue

- Mercury: generally composites, some individuals
- PCBs: sum of 55?? congeners, skip Aroclors, no coplanars
- DDTs: sum of six isomers
- Dieldrin
- Chlordanes: sum of 5 compounds
Analytes in Tissue (continued)

- PBDEs - sum of xx congeners
- Selenium - yes
- PFCs - no
- Dioxins - no
- Omega - no
- Others?
- Ancillary parameters: lipid, moisture
Ancillary water or sediment quality data?

- Will explore collaboration with Charlie Alpers’ study
Archiving

- Tiered approach
  - Long-term archives
  - Short-term archives
Sampling Methods

- E-boat
- Backpack shocker
- Gill nets
- Hook and line
QA
  • QAPP
Assessment Thresholds

- Advisory Tissue Levels
- FCGs
- State Board Mercury Objective?

DEVELOPMENT OF FISH CONTAMINANT GOALS AND ADVISORY TISSUE LEVELS FOR COMMON CONTAMINANTS IN CALIFORNIA SPORT FISH:

CHLORDANE, DDTs, DIELDRIN, METHYLMERCURY, PCBs, SELENIUM, AND TOXAPHENE

June 2008
Arnold Schwarzenegger
Governor
State of California

Linda Adams
Agency Secretary
California Environmental Protection Agency

Joan E. Denton, Ph.D.
Director
Office of Environmental Health Hazard Assessment